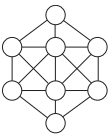
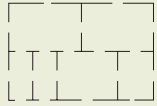

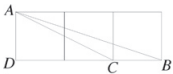


	<p>Arrange the numbers 1 to 8 in the circles so that no two consecutive integers are in circles connected by line segments.</p> 	<p>Each of three circles is tangent externally to the other two circles. The triangle formed by connecting the centers of the three circles is a right triangle. If the radii of the circles are integers, find the perimeter of the smallest possible triangle that can be formed in this way.</p>	<p>The vertex of an isosceles right triangle is at the center of a square whose side is 10. The legs of the triangle are also 10. Find the area of the overlap of the triangle and the square.</p>
<p>The solutions of the equation</p> $a^2 + b^2 + c^2 + d^2 = a \cdot b \cdot c \cdot d$ <p>may be written in the form <math>(a, b, c, d)</math>. Find all possible values for <math>a</math> such that <math>(a, 2, 2, 2)</math> will be a solution.</p>	<p>A standard 12-hour digital clock displays many palindromic times throughout the day (if we ignore the placement of the colon). For example, 3:03 is a palindromic time. Find the least number of minutes between two times that are each palindromes.</p>	<p>Have you ever noticed that <math>12^2 = 144</math> but also that <math>21^2 = 441</math>? Reversing the digits in the first number reverses the digits in the result. This phenomenon also occurs with the numbers 13 and 31: <math>13^2 = 169</math> and <math>31^2 = 961</math>. Find the next pair of nontrivial numbers (e.g., not 22 and 22) with this quality.</p>	<p>This figure represents a building with many doorways. Draw a single path that passes through every doorway in the figure without going through the same opening more than once.</p> 
<p>The integers 0 through 14 can be separated into three groups as follows: (1) 0, 3, 6, 8, and 9; (2) 1, 4, 7, 11, and 14; and (3) 2, 5, 10, 12, and 13. Each of the integers 15, 16, and 17 fits into one of these groups. Match each of these three integers with its correct group.</p>	<p>A popular desktop calendar consists of two movable cubes with a digit on each face, as shown in the figure. If you rotate the dice or switch them from left to right, the dice can be used to show any date from 01 to 31. Determine the four hidden digits on the left cube and the three hidden digits on the right cube.</p> 	<p>Three squares are arranged as shown in the figure. Calculate <math>m\angle ABD + m\angle ACD</math>.</p> 	<p>A set of distinct counting numbers has a sum of 420, and the average of the numbers is 60. What is the largest possible number in the set if one of the numbers is 120?</p>
<p>Art, Ben, and Chris run track. When all three raced, Art beat Ben by 20 yards and Chris by 47 yards. When only Ben and Chris ran the same distance, Ben beat Chris by 30 yards. Find the distance that they raced, assuming that each person ran at the same rate in both races.</p>	<p>Solve for <math>x</math>:</p> $7(7^x + 7^{-x}) = 7^2 + 7^0$	<p>Determine the smallest integral value of <math>x</math> that will make the product <math>4410x</math> a perfect cube.</p>	<p>The centers of two circles are 34 inches apart. If the radius of one circle is 6 inches and the radius of the other circle is 22 inches, find the length of their common external tangent.</p>
<p>A farmer has 12 8-foot-long straight fence segments that can be attached to one another to form an enclosure. To the nearest foot, find the maximum area that can be enclosed with the fencing.</p>	<p>Find the number of square units contained in the region bordered by the graphs of the functions <math>y = 3x</math>, <math>x = 3y</math>, and <math>3x + y = 30</math>.</p>	<p>In the expansion of <math>(x + y + z)^7</math>, determine the coefficient of the term <math>x^3y^2z^2</math>.</p>	<p>The digit 7 is written to the right of a two-digit number, thus forming a three-digit number that is 565 more than the original number. Find the original number.</p>
<p>How many positive even multiples of 3 are perfect squares and less than 1 million?</p>	<p>In <math>\triangle ABC</math>, <math>\overline{AB} = \overline{AC}</math>. Point <math>D</math> is chosen on <math>\overline{AC}</math> and point <math>E</math> is chosen on <math>\overline{AB}</math> such that <math>CB = BD = BE</math>. Calculate the ratio <math>\frac{m\angle BDE}{m\angle DAE}</math>.</p>	<p>In right triangle <math>RST</math>, <math>\angle R</math> is a right angle, and <math>RS = 2RT</math>. Point <math>D</math> is chosen on <math>\overline{ST}</math>, and perpendicular lines are drawn to sides <math>RS</math> and <math>RT</math>, intersecting at points <math>E</math> and <math>F</math>, respectively. If <math>REDF</math> is a square, find the ratio of <math>SD</math> to <math>DT</math>.</p>	<p>The recurrence formula <math>a_n = \frac{3a_{n-1} + 2a_{n-2}}{3}</math> can be used to generate a sequence of numbers, provided that two numbers in the sequence are known. If <math>a_0 = 2</math> and <math>a_1 = 4</math>, determine the value of <math>a_3</math>.</p>
<p>In the multiplication of the two-digit number <math>AB</math> by the one-digit number <math>C</math>, each letter represents a different digit. If the product is the three-digit number <math>AAA</math>, find the value of <math>C</math>.</p>	<p>The coordinates of point <math>A</math> are <math>(3, -1)</math>, and the coordinates of point <math>B</math> are <math>(5, 4)</math>. Find the coordinates of point <math>C</math>, given that <math>A</math>, <math>B</math>, and <math>C</math> are collinear and that <math>\frac{BC}{AC} = \frac{4}{5}</math>.</p>	<p>The function <math>f(x) = 0.5x + 10</math> is evaluated at a positive number <math>n</math>. The result is then substituted into the same function, and that result is <math>n^2</math>. Find <math>n</math>.</p>	<p>Determine the greatest integer that can divide each of the numbers 283, 427, and 715 to leave the same remainder in each case.</p>
<p>Given the continued fraction <math>\frac{40}{31} = a + \frac{1}{b + \frac{1}{c + \frac{1}{d}}}</math>, find <math>a + b + c + d</math>.</p>	<p>Segments <math>RS</math> and <math>ST</math> form acute angle <math>RST</math>, the midpoint of <math>\overline{RS}</math> is point <math>P</math>, and the midpoint of <math>\overline{ST}</math> is point <math>Q</math>. The bisectors of <math>\angle RPO</math> and <math>\angle TQP</math> meet at point <math>M</math>. The bisectors of <math>\angle QPS</math> and <math>\angle SQP</math> meet at point <math>N</math>. If <math>m\angle PMQ = 70^\circ</math>, find <math>m\angle PNQ</math>.</p>	<p>Cube A has a surface area that is 125% more than the surface area of cube B. If the volume of cube B is <math>x\%</math> less than the volume of cube A, find <math>x</math> to the nearest integer.</p>	